

Green Stormwater Infrastructure: The Basics



Overview

Seattle Stormwater Challenges

Green Infrastructure Tools

Evolution of Green Infrastructure in Seattle

Looking Ahead

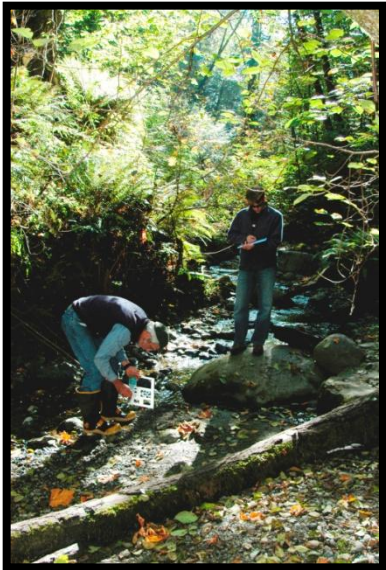


Stormwater Challenges



Flooding/ Inadequate Conveyance

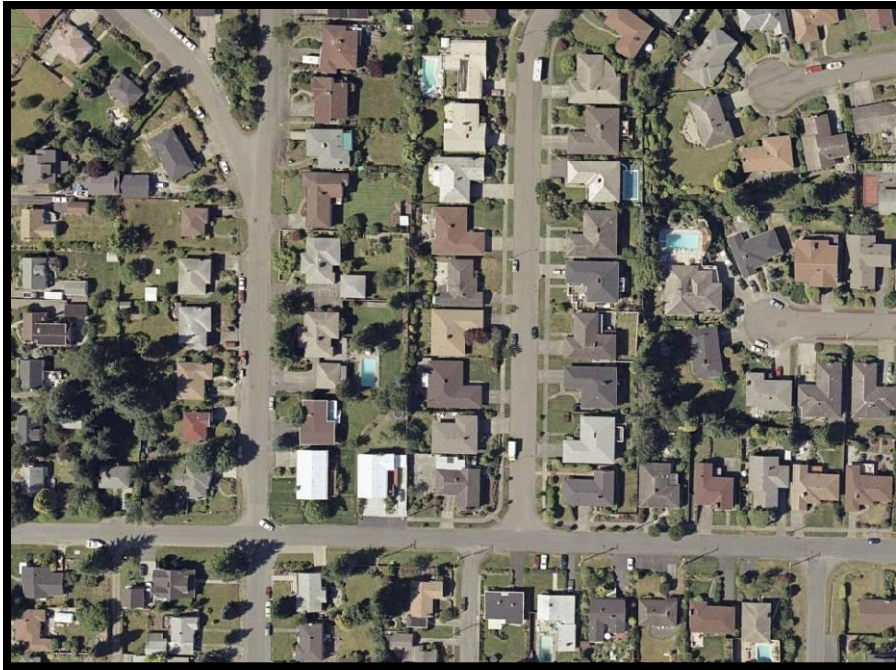
**Urban Creeks -
Erosion and Habitat**



**Water Quality-
Stormwater and
Sewer Overflow**

Green Stormwater Infrastructure

Tries to make
this...



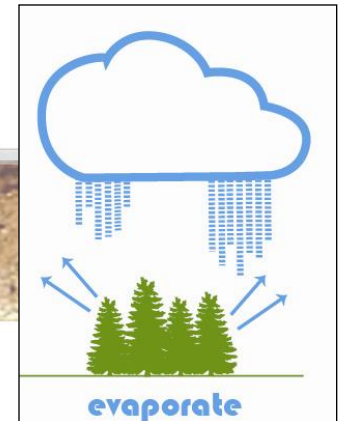
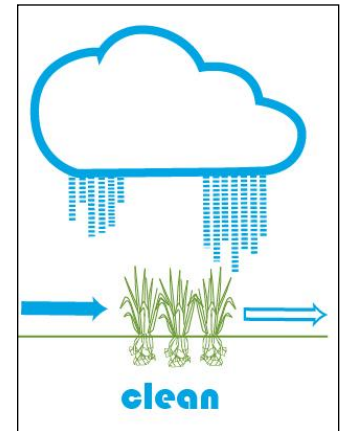
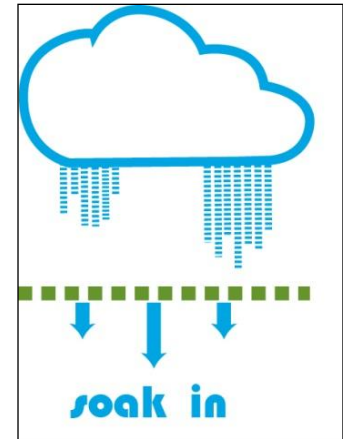
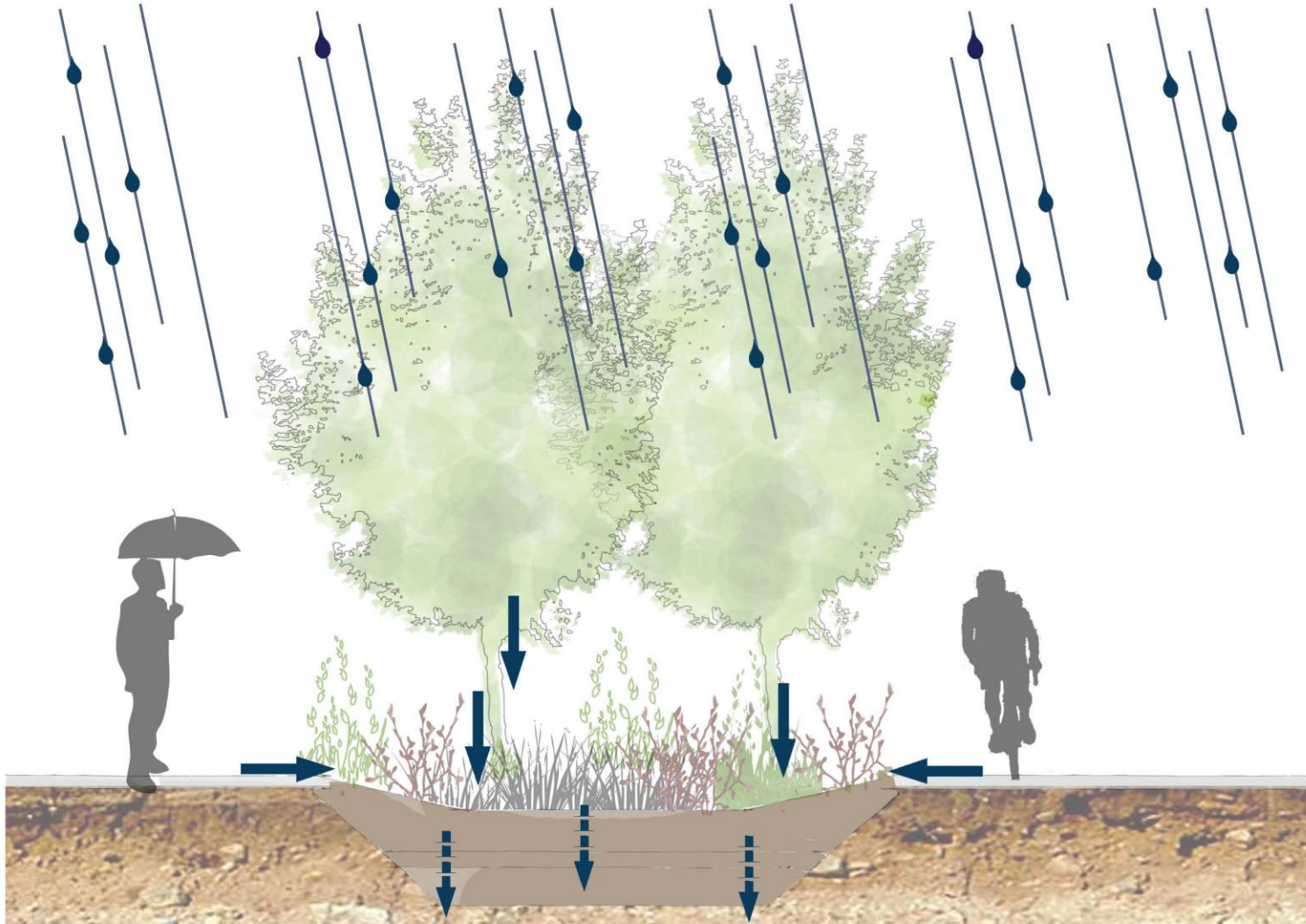
...function more
like this.



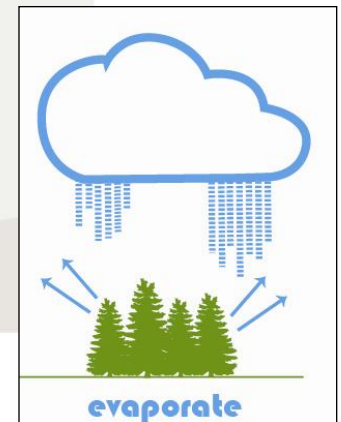
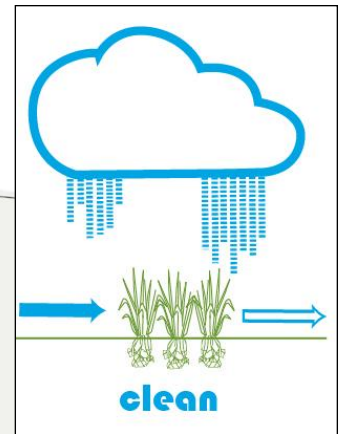
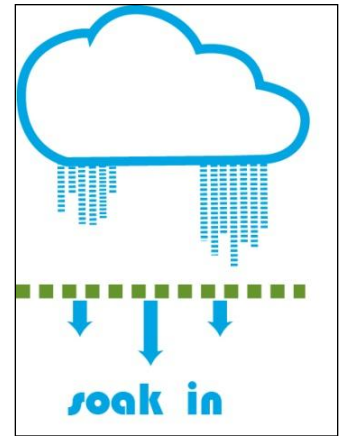
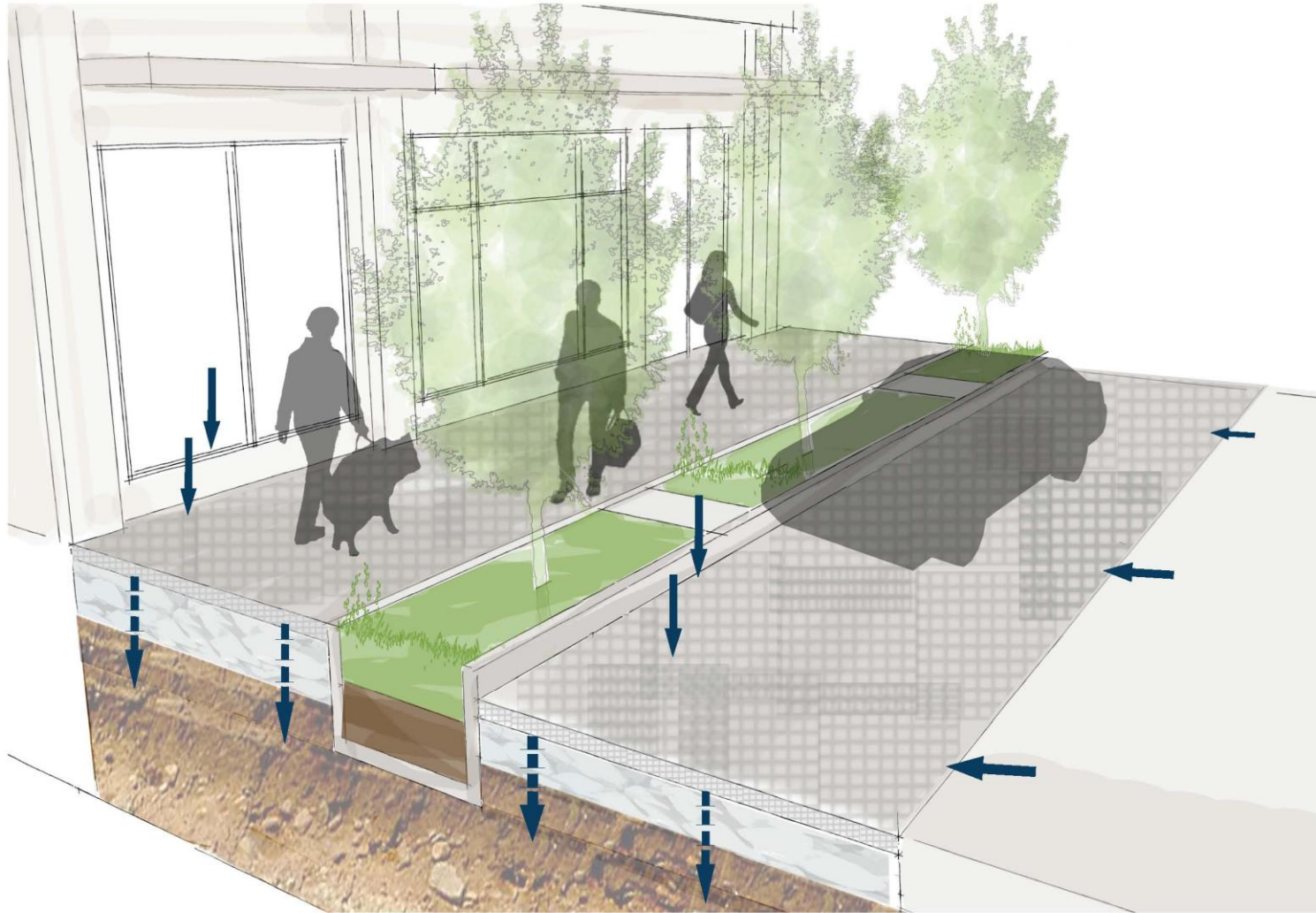
Green Stormwater Infrastructure



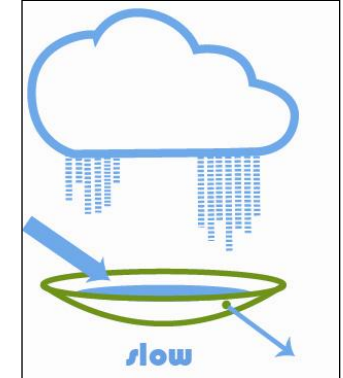
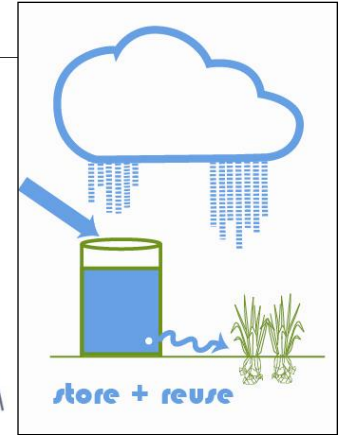
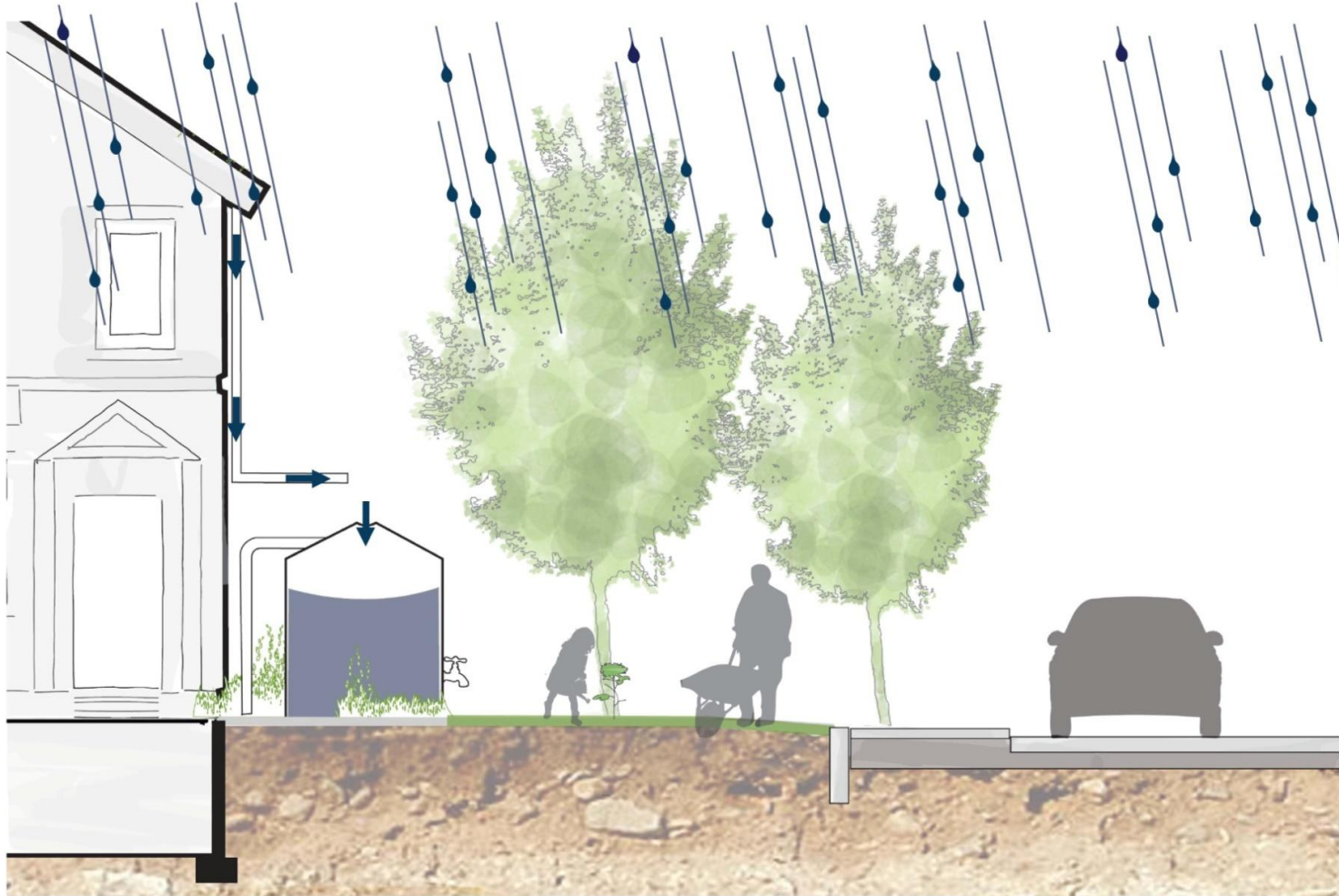
Bioretention (Rain Garden)



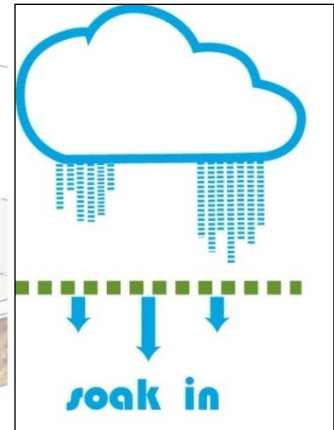
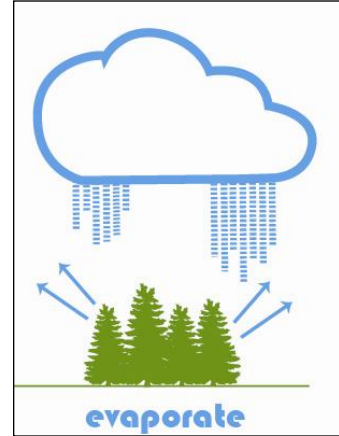
Permeable Pavement



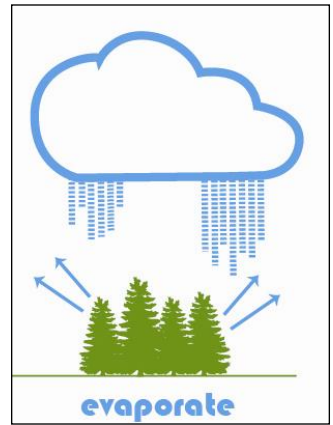
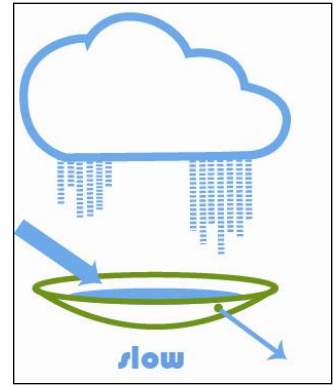
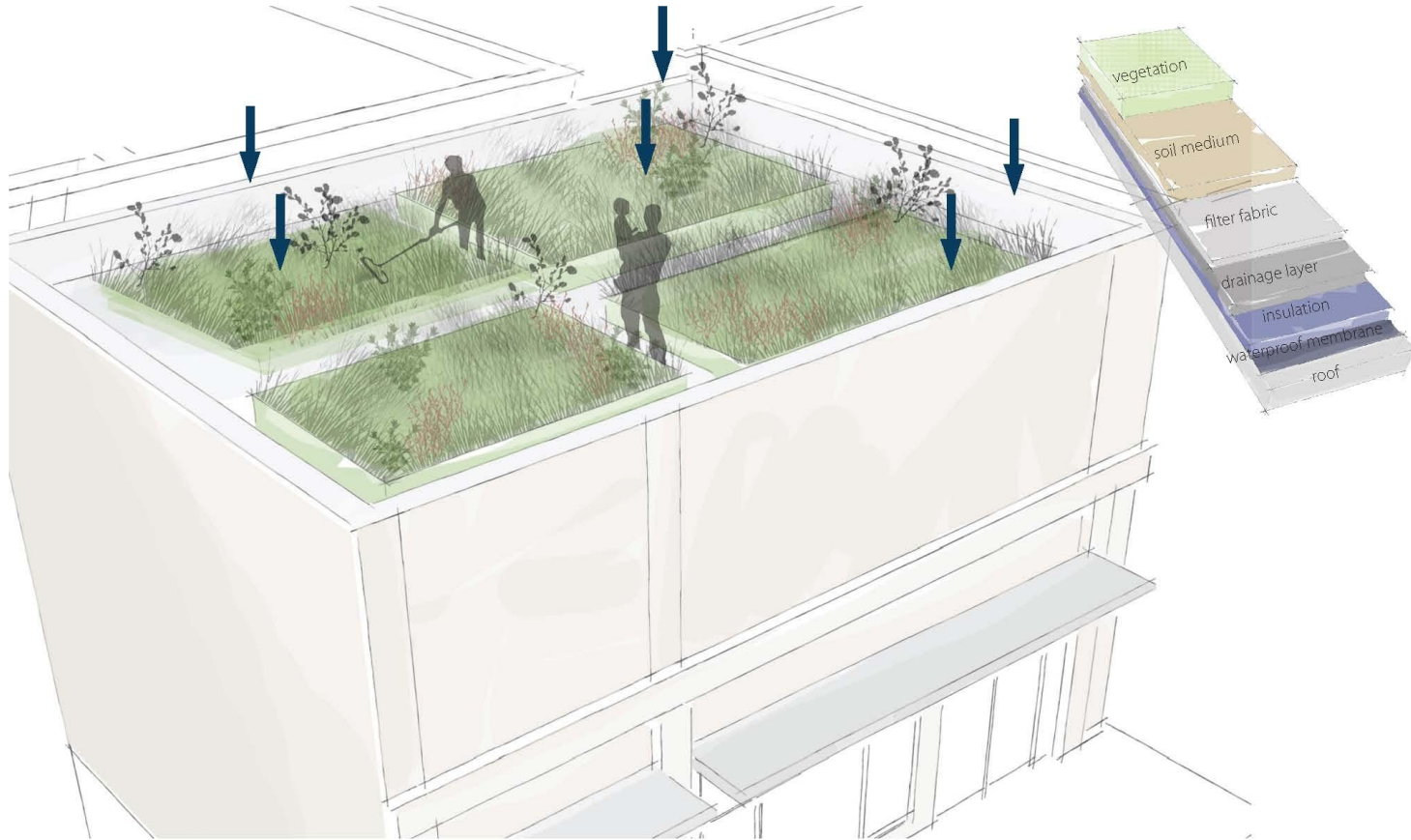
Rainwater Harvesting / Cisterns



Trees



Vegetated Roofs



Proven method for managing stormwater

DEPARTMENT OF
ECOLGY
State of Washington

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Developing Low Impact Development (LID) Standards

In 2009-2010, the Department of Ecology's Water Quality Program conducted a process to develop definitions and standards for low impact development (LID) stormwater requirements in the [Phase I Municipal Stormwater General Permit](#).

The Pollution Control Hearings Board (PCHB) ruled in [August 2008](#) that Ecology must add requirements to the Phase I permit that apply to local governments covered under the permits. The PCHB ruled in [February 2009](#) that Ecology begin to prepare [Western Washington Phase II permits](#) for future implementation of LID. Ecology convened this stakeholder advisory process to provide input on those requirements.

EPA Region 10 funded Ecology to conduct an eight-to-ten month process to take input from two advisory committees: a [technical advisory committee](#) and an [implementation advisory committee](#).

Over the next two-year process of [reissuing the permits](#), Ecology will make a decision on LID permit requirements. The process for issuing permits includes a number of opportunities for public input. Ecology issues a draft permit for public review and comment as part of modifying any permit. It issues the final permit with a Response to Comments and information on appeal procedures. Ecology expects to incorporate the standards in the Stormwater Management Manual for Western Washington.

The Puget Sound Partnership (PSP) calls for these standards as a priority action in the 2008 Puget Sound Action Agenda. The [PSP LID program](#) has led the region in advancing LID.

NEW! Special Joint Technical and Implementation Advisory Committee Meeting On Ecology's May 16 Preliminary Draft LID Language

May 26, 2011
9:30 AM to 3:00 PM
Federal Way City Council Chambers ([Map](#))

Meeting Materials

- [Agenda](#)
- [Ecology PowerPoint presentation on LID preliminary draft](#)
- [Meeting summary](#)

Please bring your lunch.
Ecology will give an overview of the preliminary draft LID language for

Advisory Committee Meetings

Technical Advisory Committee
Committee materials, including a list of members, meeting materials, and documents.

EPA United States Environmental Protection Agency

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Water: Green Infrastructure

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Green Infrastructure

Green infrastructure is an approach that communities can choose to maintain healthy waters, provide multiple environmental benefits and support sustainable communities. Unlike single-purpose gray stormwater infrastructure, which uses pipes to dispose of rainwater, green infrastructure uses vegetation and soil to manage rainwater where it falls. By weaving natural processes into the built environment, green infrastructure provides not only stormwater management, but also flood mitigation, air quality management, and much more.

At a time when so much of our infrastructure is in need of replacement or repair and so few communities can foot the bill, we need resilient and affordable solutions that meet

Features

EPA Announces Availability of Technical Assistance to Facilitate Green Infrastructure – EPA is now accepting letters of interest from communities interested in receiving direct assistance for eligible projects. [Learn More](#)

EPA Releases Strategic Agenda to Protect Waters through Green Infrastructure – Through the action items outlined in this [Agenda \(PDF\)](#) (5 pp, 249K, [About PDF](#)) EPA hopes to expand the use of green infrastructure to protect and restore waters while creating more environmentally and economically sustainable communities. [Learn More](#)

OW and OECA Release Joint Memo on Green Infrastructure – This joint memorandum (PDF) (5 pp, 343K, [About PDF](#)) encourages

EPA United States Environmental Protection Agency

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News Releases - Water

EPA Launches New Strategy to Promote Use of Green Infrastructure for Environmental and Economic Benefits

enesta@epa.gov, 202-564-7873, 202-564-4355

The United States Environmental Protection Agency (EPA) is launching a new strategy to help cities and towns to reduce stormwater runoff that pollutes rivers and coastal waters. Green infrastructure decreases runoff where it falls and keeping polluted stormwater from entering waterways protects Americans' health by decreasing water pollution, creating jobs and community benefits including increased economic activity and energy savings and increased recreational and green

cities and towns across the nation clean up their waters and expand green infrastructure," said Deputy Assistant Administrator for Green Infrastructure. The agenda was announced at a Green Street, Green Jobs event in the Washington, DC metropolitan area. The strategy aims to protect the health of our waters while creating local jobs, saving money and making communities healthier and more prosperous places to raise a family and

Addressing some of the challenges to water quality in the nation. Large volumes of stormwater runoff in cities' rivers, lakes and aquatic habitats and contribute to water pollution. Green infrastructure captures and filters pollutants by passing stormwater through vegetative green infrastructure tools and techniques include permeable pavement, tree pits, rain gardens and other green infrastructure designs for streets and buildings, trees, rain gardens

Seattle
Public Utilities

Growing the Program: Building GSI Experience and Knowledge

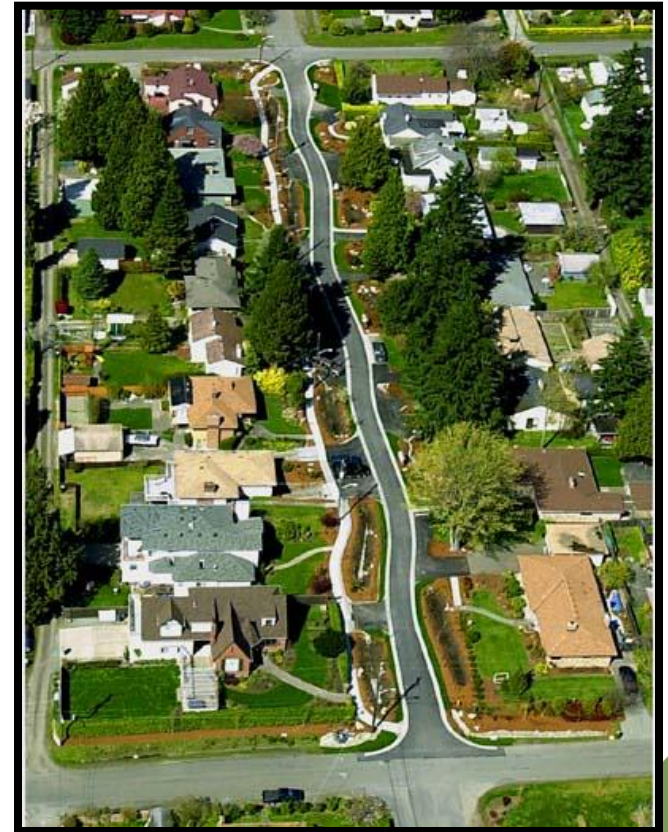
Project	Project Drainage Area
SEA Street #1	2 acres
Carkeek Cascade	28 acres
Broadview Natural Drainage System	32 acres
Pinehurst Natural Drainage System	49 acres
High Point	129 acres
Thornton Creek Water Quality Project	660 acres
Ballard Roadside Rain Gardens	3 acres
Swale on Yale	435 acres

The Beginning of GSI in Seattle: SEA Street



Pre-project

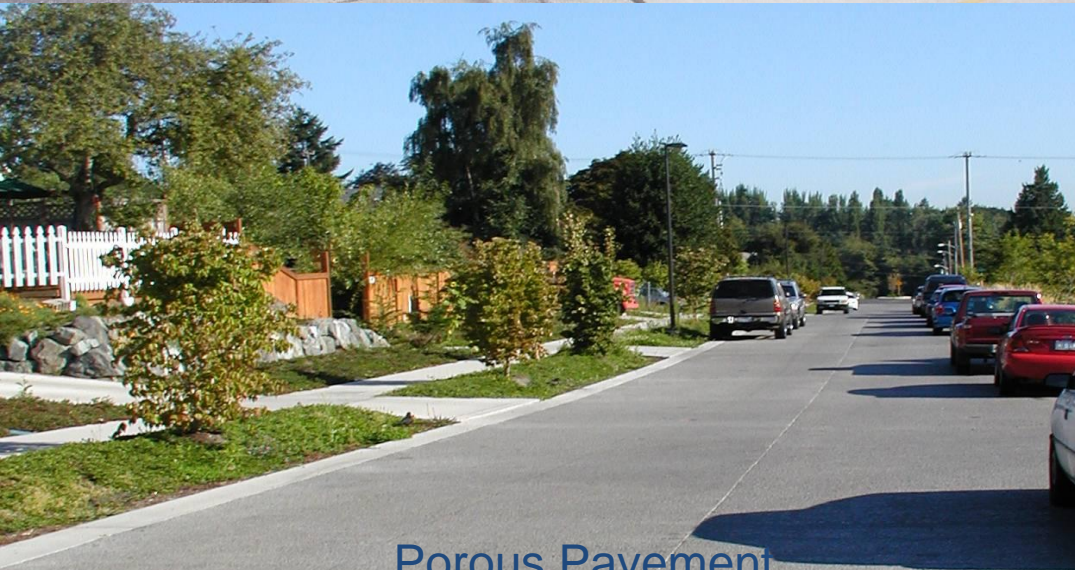
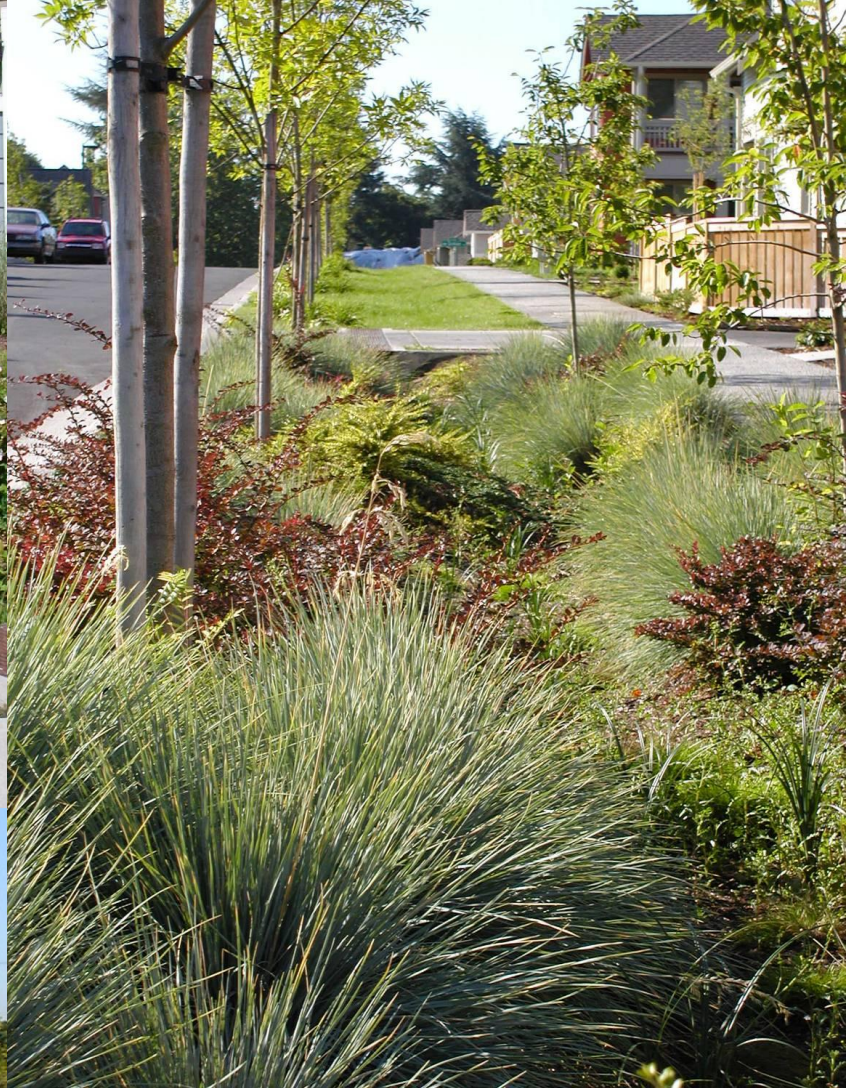
- Achieved 99% reduction in runoff
- Treated local runoff only
- Added formal drainage system and sidewalk



2001

Broadview and Pinehurst Natural Drainage Systems





Porous Pavement

High Point

Seattle
Public
Utilities

Ballard Roadside Rain Gardens Pilot



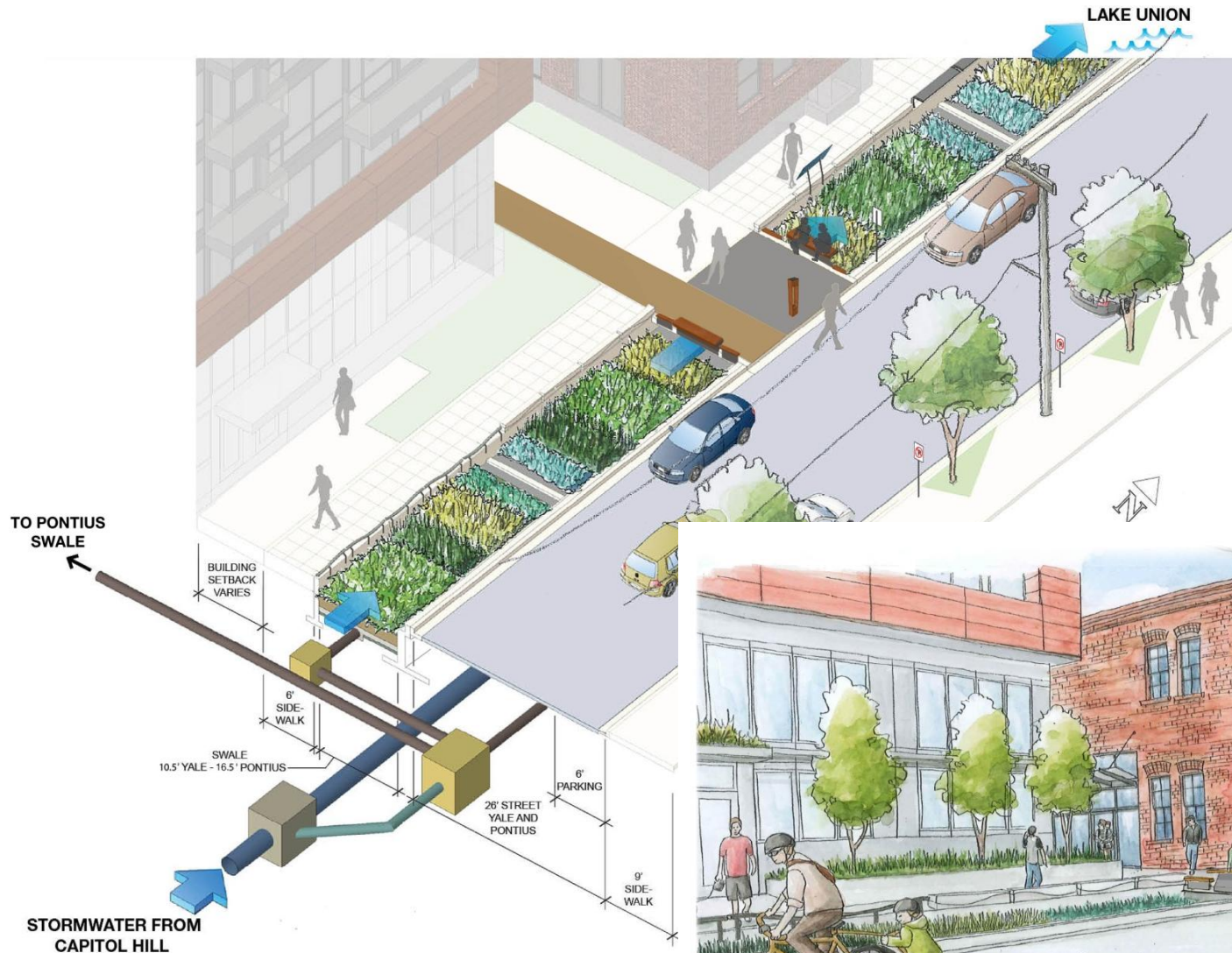
Ballard Roadside Rain Gardens



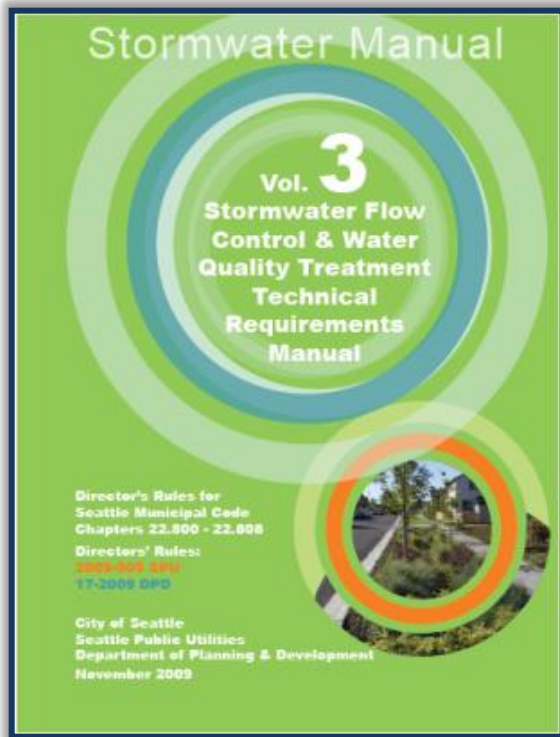
Lessons Learned

- Conduct thorough technical work up front
- Understand the Community Context
- Timely, Clear and Transparent Community Engagement
- Be prepared to adjust to site conditions during construction

Capitol Hill Water Quality Project/ Swale on Yale



Seattle's Stormwater Code Requires GSI



Incentives for Voluntary Use: RainWise



The screenshot shows the Seattle RainWise website. At the top is the Seattle.gov logo and navigation tabs for 'My Community', 'My Footprint', and 'Marketplace'. Below this is a search bar for 'Find your property's footprint'. The main heading is 'Be RainWise', followed by a paragraph explaining that rain on roofs and driveways carries pollutants to local water bodies. A video player shows a rain garden with the text 'Rain gardens: Retain, filter and clean stormwater with native plants'. Below the video are three sections: 'Explore' (exploring solutions), 'Find' (locating projects), and 'Get Started' (selecting a contractor). A map section asks 'Do you live in Ballard?' and provides a map of the Ballard neighborhood. The footer contains contact information for Seattle Public Utilities and links to various city resources.

SEATTLE.GOV
Seattle Public Utilities

Powered by project360
Log In or Register

My Community | My Footprint | Marketplace
Overview | RainWise Solutions | Related Programs | Map

Find your property's footprint

Be RainWise

Rain that falls on our roofs, driveways and other hard surfaces can carry pollutants to our creeks, Lake Washington, and Puget Sound. During big storms, the sheer volume of this "storm water" can flood homes, cause sewer overflows, and erode hillsides and streambanks.

We can all help to slow and clean the rain runoff from our homes with simple projects that are useful and attractive additions to our yards.

Rain gardens
Retain, filter and clean stormwater with native plants

Explore
Explore useful solutions for controlling stormwater around your home.

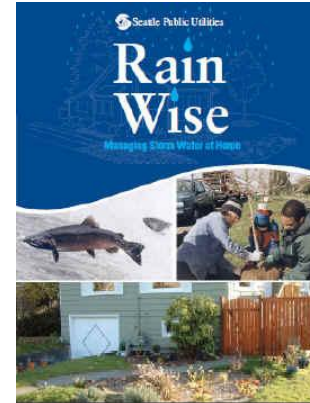
Find
Locate RainWise projects and share your own.

Get Started
Select a contractor to install your project.

Enter Your Address **Get Started** Find your home on a map and calculate your stormwater impact.

Do you live in Ballard?
Find out about financial incentives for stormwater actions.
Learn More

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www.rainwise.seattle.gov

Why GSI in the Urban Drainage Strategy?

Many benefits beyond better water quality

- **New small-business opportunities;**
- **Flexible responses to adapt to climate change;**
- **Groundwater recharge;**
- **Improved neighborhood streetscapes**
- **Opportunity for residents and businesses to help through actions**



GSI Strategies Going Forward



- Meet regulatory requirements
- Require during redevelopment and new development
- Partner in City projects and programs to meet multiple goals
- Incentives for voluntary use

Cisterns

Can reduce peak runoff and help conserve water

Questions?

Tracy Tackett

GSI Program Manager

www.seattle.gov/util/greeninfrastructure



City of Seattle
Seattle Public Utilities
Ray Hoffman, Director